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"CROP ROTATIONS AND HUMUS"

Broadcast No. 6 in a series
of discussions of soil con-
servation in the Ohio Valley.

WLW, Cincinnati

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Dayton, Ohio

SOUND: Thunder, followed by rain...

ANNOUNCER

Fortunes Washed Away!

MUSIC: Fading...

ANNOUNCER

Water, wind, and fire are friends of man. Since time began, water has quenched his thirst. Fire has cooked his food, warmed his body. Gentle winds have caressed all nature.

SOUND: Whistling wind, followed by fire crackling thru following speech...

ANNOUNCER

But water, wind, and fire may at times be nature's most devastating trio. Water, in its ruthless surge, may sweep away the topsoil that grows the crops that feed the world. And wind, whipping and blinding, may carry away the parched earth, and with it, the bread basket...and fire, fire in woodlands, fire on a prairie, or a fire burning away the unwanted broomsedge may...well, let's look into the laboratory of a soil scientist...

SOUND: Steam escaping and water boiling. Clink of glasses.

SCIENTIST

Humph! Just what I thought! Look here, Jay.

ASSISTANT

What's the matter? Is that the----

SCIENTIST

Nothing's the matter. See? These soil samples weighed out just what I thought they would. This one...

ASSISTANT

Yes...

SCIENTIST

...this weighs 86 pounds. And this one only 65 pounds.

ASSISTANT

Well, uh...they're both the same size, a cubic foot, and they're both dirt. They oughta weigh the same, hadn't they?

SCIENTIST

Now, should they?

ASSISTANT

Well, it looks to me like...oh, I see! The heavy one has more water in it!

SCIENTIST

No, they were both dried, thoroughly. The difference, Jay, is forty years of farming.

ASSISTANT

Forty years...you wouldn't kid me, Doctor Bradfield?

SCIENTIST

Here's the difference. Take some of this heavy soil in your fingers. Feel it.

ASSISTANT

...yeah. Feels like any old dirt to me.

SCIENTIST

Now try this one.

ASSISTANT

...Say, this is different. Sorta soft and mellow...why?

MUSIC: Fading...

ANNOUNCER

The answer is humus--a substance that spells the difference between productive soil and sterile dirt. But whether it be called humus, organic matter, or plant and animal residue, it remains a life-giving substance to soil, to plants, to animals, to man...

MUSIC: Fading...

ANNOUNCER

There is life in the soil. Not just worms and beetles but countless organisms invisible to the naked eye. For centuries, the mystery of growing plants baffled man. Roman literature treated the subject. And, in 1563, Bernard Palissy, a Frenchman, said:

PALISSY

When you bring organic matter into the field it is to return to the soil something that has been taken away.

ANNOUNCER

Other early authorities on agricultural chemistry recognized the importance of decaying organic matter. They declared that "corruption is the mother of vegetation." Such ideas prevailed until the advent of modern soil bacteriology. Today, in the classroom of a modern university, such as Purdue, such as Michigan State, such as--any modern university...

SCIENTIST

...We call these tiny residents of the soil--bacteria. They are so small that millions of them exist in one cubic centimeter of soil. You remember--Jay, you remember, but I think you'd better wake up your neighbor...

ASSISTANT

Hey, Taylor, wake up!

NEIGHBOR

Oh! Oh, I'm sorry.

SOUND: Laughter

SCIENTIST

Getting back to the subject, after your pleasant dreams, Mr. Taylor, millions of bacteria live in a cubic centimeter of soil. Yesterday, Jay and I weighed a cubic foot of good rich topsoil, and it weighed 65 pounds. That sample of virgin soil had lots of humus in it. We weighed, also, a cubic foot of eroded soil. It weighed 86 pounds. That soil came from a field that had been farmed, rather constantly as nearly as we could learn, for forty years.

ASSISTANT

I think I know the answer to what you're going to ask, Dr. Bradfield.

SCIENTIST

All right, Jay. I was going to ask which soil sample had the most bacteria in it.

ASSISTANT

The one with humus in it.

SCIENTIST

(Chuckling) Absolutely correct. Absolutely correct. But I don't think that you'd have known it if you hadn't been in the laboratory yesterday, Jay.

SOUND: Students laughing...

ASSISTANT

Yes, I would too.

SOUND: Students laughing, jeering...

SOUND: Rapping to order. Gently first, then sharply, and talking subsides.

SCIENTIST

I think we've had enough levity for awhile. Now, I'm going to tell you about the relation of humus and bacteria and soil productivity, so get out your notebooks...

SOUND: Subdued conversation, rustling of papers...

SCIENTIST

Now, listen, or some of you will be spending the midnight oil writing home about an unreasonable professor... Humus keeps the soil fluffed up, keeps it from packing, leaves air spaces in the soil. Naturally, air is lighter than soil particles. Now, on the other hand, eroded, worn-out soil is as lifeless as it looks. Soil particles in eroded soil pack together. They stick tight to each other. Even the air can't get between them, let alone water.

ASSISTANT

Is that why bald spots dry out so quick and plow hard?

SCIENTIST

Yes, you see water won't percolate into hard soil. That's one reason why humus is so important in soil conservation...

SOUND: Dinging of gong, ending class. Shuffling of feet, talking, etc.

SCIENTIST

Well, that's all for today. Next meeting we'll take up...

MUSIC: Fading...

ANNOUNCER

Our forefathers wasted the humus in the soil. But, according to the Soil Conservation Service--and I think farmers will agree--that's no reason we should do the same thing. So let's turn to the Dayton, Ohio, office of the Soil Conservation Service. Gene Charles, you seem to be first.

CHARLES

First in war...war against soil erosion, but second in discussing humus. I mean...I think R. O. Cole here ought to discuss the humus part of it. Mr. Cole is from Purdue...

ANNOUNCER

Then he should certainly be in on this.

CHARLES

Yes, and I'd like to explain that Mr. Cole is the extension soil conservationist from Indiana.

ANNOUNCER

Then he ought to know all about humus...

CHARLES

...And crop rotations. But I've got a question that will stump him. R. O., do you know when farmers first started to rotate their croplands?

COLE

Why, yes...wait a minute now...what is this?

CHARLES

I thought that would stop you. Do you know what Virgil said about it?

COLE

I won't try to guess--don't even remember for sure when Virgil lived.

CHARLES

Well, Virgil must have been quite a farmer as well as a poet-- because away back 37 years before the time of Christ, Virgil said that "The strain on the soil will be an easy one by alternating the crops."

COLE

Good for Virgil!

CHARLES

But I wonder if he knew about the strain that soil erosion puts on the land!

COLE

He probably did. It isn't hard to put organic matter into the soil. If you do it right, you can even put humus into land that's worn out. All you have to do is use proper crop rotations.

ANNOUNCER

Yes? Maybe I don't get it, Mr. Cole, but just what is a good crop rotation that will bring on humus? Corn, oats, and wheat? There's three crops.

COLE

There's three crops, but they don't make a true crop rotation. Corn, oats, and wheat, then corn, oats and wheat over again wouldn't be a true crop rotation. You've got to have more than just one crop after another. The crops must balance. That's why we talk about balanced crop rotations, you see.

ANNOUNCER

I see--partly. What do you mean by "balanced"?

COLE

It's like this. Some crops like corn and cotton and tobacco take a lot out of the soil, and put almost nothing back. Crops like alfalfa and clover--the legumes, actually add something useful to the soil. So, in working out a crop rotation we try to make the effects of soil-saving crops equal to, if not greater than, the effects of depleting crops.

CHARLES

And so if you use corn, wheat, and alfalfa you have a balanced rotation.

COLE

Right!

CHARLES

Then what about this humus or organic matter?

COLE

From the soil conservation standpoint, the crop rotation does three important things. It maintains that balance between in-put and out-go of soil elements. Helps to maintain fertility, in other words. Then, rotating crops instead of just planting the same crop year after year keeps the ground under a vegetative cover most of the time. For example, if you plant a field to corn four years in a row, your land lies bare and unprotected most of the time. The corn furnishes cover only about 12 months out of the entire four years.

CHARLES

And not a very good cover, either.

COLE

No, it isn't. But if you used a balanced 4-year rotation of corn, wheat, meadow, and meadow, your land would be covered with vegetation at least 40 months out of the 4 years. And be good cover, too. Close-growing wheat and a grass-legume sod.

CHARLES

And that would help prevent soil erosion!

COLE

It certainly would.

CHARLES

What you said about close-growing cover fits in with this question that came in the mail the other day. This farmer writes: "It seems that I lose a great deal of my topsoil from corn land during winter and spring. How can I prevent such loss?" This is one of your Indiana farmers, Cole. How would you answer him?

COLE

If his fields will permit it, I would recommend contour strip cropping, in a balanced rotation. This will keep the land covered up most of the time. Or he could simply use a winter cover crop, sown in the corn early in the fall. That will give his land a mighty fine overcoat for winter.

CHARLES

And furnish green manure if he plows the cover crop under in the spring.

COLE

Yes.

CHARLES

That brings us back to the subject of humus.

COLE

That's the third important thing I referred to a while ago.

A crop rotation puts a lot of organic matter back into the soil--fills it full of vegetable rubbish, if you please.

Something for the bacteria to work on.

CHARLES

Such as?

COLE

Such as corn stalks, wheat stubble, and especially grass and legume roots. Better still, a green manure crop--that is, a good growth of alfalfa and grass--or clover and grass--plowed under to enrich the soil.

ANNOUNCER

May I interrupt? Do you mean to tell me that has any apparent effect in reducing erosion?

CHARLES

Let me answer that, R. O. It surely does have an effect, _____ . Here's the answer in some facts given out by Dr. Hugh Bennett, Chief of the Soil Conservation Service, on several soil conservation experiment stations. Here now, look at this one from Zanesville, Ohio.

ANNOUNCER (reading)

Where corn was grown in a good 4-year rotation about 18 percent of the annual rainfall ran off the land, carrying with it 8 tons of soil per acre, each year.

CHARLES

Now look down here what happened when corn was grown year after year.

ANNOUNCER (reading)

Corn...grown continuously...the loss...was more than 35 percent of the rainfall and almost 60 tons of soil per acre. Whew! Why that's...let's see...seven...seven and a half times as much.

COLE

Yes, sir. And out in La Crosse, Wisconsin, a three-year rotation reduced the soil loss by more than two thirds.

CHARLES

Experiments gave similar results down in the cotton country, too.

ANNOUNCER

You soil conservationists really prove your points. I guess crop rotations do hold the soil. But now, wouldn't the farmer be interested in the dollars and cents angle? Does a rotation affect his income?

CHARLES

It certainly does. Just a minute...I've got some facts on that (shuffling papers). Here it is. At the Purdue Agricultural Experiment Station corn grown in a four-year rotation averaged a \$17.50 per acre greater annual gross value than did the corn when grown on the same land continuously for a period of 20 years. This increase in returns, due to the four-year rotation, was calculated by valuing corn at fifty cents per bushel.

ANNOUNCER

Is that so? Well, Mr. Cole, a while ago you said organic matter would improve lawns and gardens. You wouldn't have me follow a crop rotation in my front yard--right down here on _____ Street in Cincinnati, would you?

COLE

No, _____, I guess that wouldn't be so good, but you can apply the same principles that the farmer applies. Remember, good grass cover will go a long way toward maintaining the humus content in the soil. Most people starve their lawns. They need to apply fertilizers and build up the soil--or give the lawn a good dressing of topsoil that does have a lot of humus in it. Grass won't grow unless you feed it.

ANNOUNCER

So, whether it's the farmer's field or the city man's lawn you need humus in the soil if you want to prevent erosion, eh?

CHARLES

It sure helps, _____. J. S. Cutler puts it pretty well in this bulletin of his. Here's what he says of crop rotations:

"Clean-tilled crops take up the plant food and offer scant protection against run-off waters. Leguminous crops, on the other hand, restore nutrient material to the soil and slow the movement of water. In other words, a correct crop rotation increases yields, improves soil fertility, and reduces the effect of erosion."

ANNOUNCER

That's good, say where...you didn't show me this.

CHARLES

It's a little pamphlet Mr. Cutler wrote--lot of good points in it.

ANNOUNCER

Do you have any more?

CHARLES

Yes.

ANNOUNCER

How about offering it to our radio audience?

CHARLES

All right. Just ask them to write for it.

ANNOUNCER

Fine...and then we'll see you men from the Soil Conservation Service again next Saturday at this same time.

CHARLES

We'll be here.

ANNOUNCER

And to our radio friends, may I say that I believe you will find this pamphlet interesting. It's called "Anchoring Farmlands in the Ohio Valley Region." If you would like to receive a copy, simply address your request to Soil Conservation, Dayton, Ohio. Just ask for a copy of "Anchoring Farmlands." The pamphlet is well illustrated--and easy to read. For example, here's a scenic view of contour strip cropping that says: "The conservation farming pattern brings crop production into harmony with the laws of nature. Roots bind the soil and hold it in place, stems and stalks check the progress of moving water and protect the soil from pelting rain."

SOUND: Thunder, followed by rain.

ANNOUNCER

This is an educational presentation of the Nation's Station.

